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A feeling of entire devotion to the cause, which Lady Franklin has so nobly sustained, and a firm determination to effect all that men could do, seems to have supported them through every difficulty. With less of this enthusiastic spirit, and cheerful obedience to every command, our small number—23 in all—would not have sufficed for the successful performance of so great a work.

F. L. M'CLINTOCK, Captain, R.N.,
Commanding the Final Searching Expedition.

The yacht *Fox*, R.Y.S., off the Isle of Wight, Wednesday, Sept. 21, 1859.

NAVIGATION OF THE MISSOURI.

It has been demonstrated by the enterprise of the American Fur Company that the Missouri River is navigable for steamboats to Fort Benton, a point within 60 miles of the headwater of the Columbia, and 3,120 miles from the Mississippi. The *Chippewa* left St. Louis on the 1st June and the mouth of the Yellow Stone 3d July, and arrived at Fort Benton on the 17th July, with 130 tons of freight, consisting of Indian annuities and the outfit belonging to the Fur Company. Starting on her return, on the 18th July, she was at the mouth of White River on 2d August, and arrived at St. Louis on the 19th August, having made the voyage of 6,240 miles in 80 days. Very little trouble was experienced in ascending the river above the Yellow Stone, excepting at Douphain's Rapids, over which the steamer was hauled by line. The trip has thus demonstrated the practicability of navigating the upper river, and with greater certainty since the *Chippewa* succeeded during a low stage of water. One month earlier she would have had no difficulty at the rapids before mentioned.

SOUTH CAROLINA:

HER NATURAL RESOURCES AND AGRICULTURAL PRODUCTS, BY OSCAR M. LIEBER, STATE GEOLOGIST OF SOUTH CAROLINA.

A cursory notice of those peculiar features of South Carolina, which are connected with her agricultural and mineral wealth, will scarcely fail to interest even distant readers. Under this impression, I, therefore, now beg leave to present a map, prepared for the fourth annual report on the geognostic survey of South Carolina,* on which I have represented the zones of the different agricultural productions, and the localities of different minerals of value. On a smaller map on the same plate the areas of indigenous forest growth are exhibited.

Maps of this description are capable of throwing so much light upon the occupation, habits, commerce and prospects of a people, and upon the internal and external importance of a country, that it is not unnatural to express surprise at the comparatively few and meagre contributions of the kind which our confederacy has hitherto furnished. At all events this deviation from the prescribed, or a least adopted, schedule of ordinary geognostic reports is sufficiently excusable upon the grounds of the importance of the subject.

The plate thus offered scarcely demands any very extended explanation; but still a brief communication should accompany it.

In glancing over the map, the reader will very soon be struck by the fact that, crossing the State, near the centre, in a northeasterly direction, several lines appear in close proximity, and thus divide the State into two sections. These lines are:

1. The boundary of the crystalline rocks.
2. The boundary of the pine barrens.
3. The boundary of corn as a staple.

To these we might also add as closely approximating to them:

4. The lower boundary of small grain.
5. The line above which gold occurs.

It is easily conceived that the coincidence of a number of boundary lines, of such importance in their direct connection with practical pursuits, must exert very powerful influences upon the character of the inhabitants of the two regions thus separated—an influence which is observable in the occupation, habits, thoughts, standard of education and even politics of the

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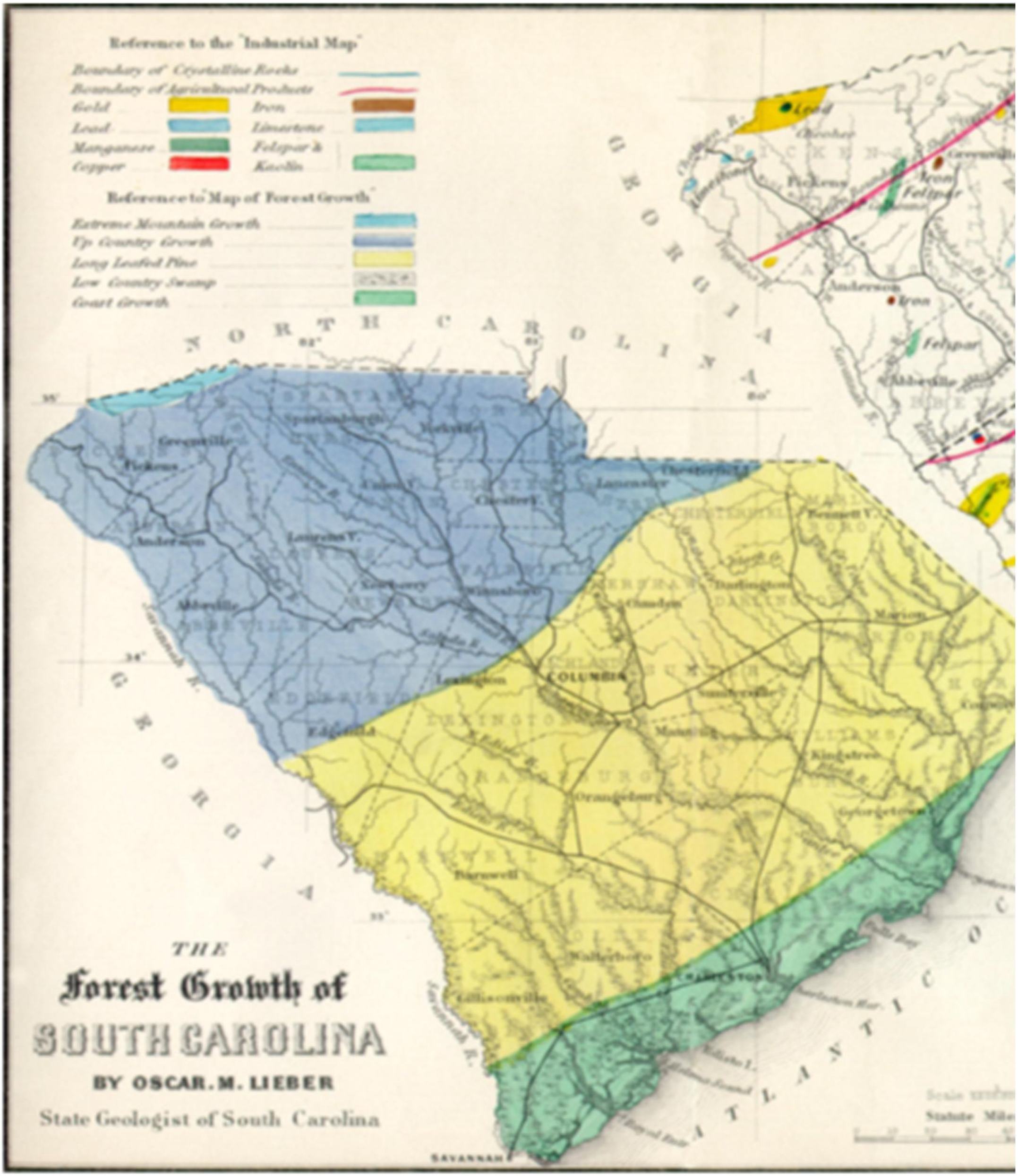
* Not yet published.



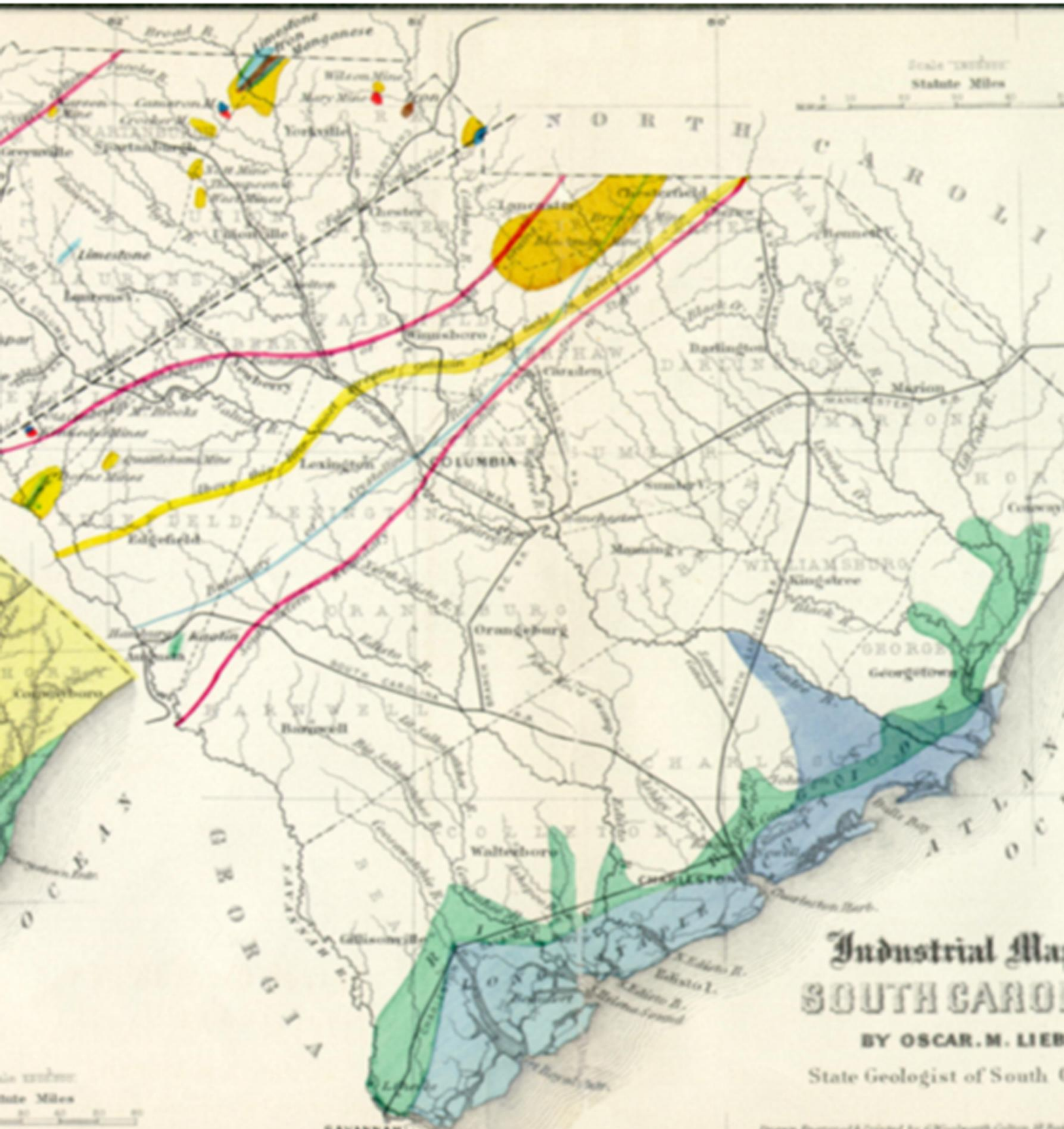
THE

Forest Growth of

SOUTH CAROLINA

BY OSCAR. M. LIEBER

State Geologist of South Carolina


Industrial Ma
SOUTH CAROL
BY OSCAR. M. LIEB
State Geologist of South C
Drawn, Engraved & Printed by G.Woolworth Colton
Statute Miles
N O R T H
C A R O L I
A T L A N
O C
O C E A N
G E O R G I A
Limestone
Iron
Manganese
Wilson Mine
Mary Mine
Cameron M.
Yorkville
Spartanburg
Limestone
Laurens
Union
Unionville
Chester
Lancaster
Chesterfield
Winnsboro
Newberry
Camden
Darlington
Bennett
Marion
COLUMBIA
Lexington
Sumter
Manning
Kingstree
Conway
Georgetown
Edgefield
Orangeburg
Kingston
Hamburg
Aiken
Barnwell
Walterboro
CHARLESTON
Charleston Bar.
Gillisonville
Beaufort
N. Edisto R.
Edisto I.
S. Edisto R.
SAVANNAH
Broad R.
Savannah R.
Quattlebaum Mine
80°
81°

l Map of

ROLINA

.M. LIEBER

f South Carolina

h Colton, 18 Beekman St New York.

two sections; for all of these are, in most instances, to a greater or less extent, the result of circumstances connected with the physical configuration of a country, its climate and natural capacities. This difference has always been acknowledged, and hence our State has in common parlance long been divided into the up-country and low country, although the separating line has never been very clearly defined.

The mineral resources of the State, inasmuch as they enjoy priority in origin, should very properly receive the same in description.

The geological survey has not yet advanced sufficiently far to enable me to offer a geological map of the entire State, but it is scarcely too early to attempt to lay down the areas of our chief mineral resources. Even there, however, we are forced to confine ourselves chiefly to those capable of exportation. The different varieties of building materials, (the superb granite of Columbia, the red sandstone of Chesterfield, etc.), soapstones, clays, marls, etc., etc., it would be next to impossible to notice with precision.

Gold is at once perceived to be our most widely distributed metal. Many of its occurrences I have, however, not deemed of sufficient importance to notice.

The chief gold regions of our State are found near the junction of the dividing line of Edgefield and Abbeville Districts with the Savannah River, (embracing the justly famous mine of Mr. Dorn); and again in the southern part of Lancaster District, extending into Chesterfield (embracing the Brewer, Hale, Blackman, Stevens' and Belk's mines and others). From the geognostic, as well as geographical features of the two regions, it is probable that they were originally connected, and that their separation is due to the denuding influences of the Saluda, Broad and Wateree Rivers and their tributaries.

Another somewhat conspicuous gold region appears on the western slope of King's Mountain in York, Spartanburgh and Union, embracing the Martin deposit mine, the Darwin Mine and others, although more prominently distinguished in North Carolina by the King's Mountain Mine. In Union we also perceive another auriferous locality on the Pacolet, embracing the Thompson and West Mines, the Nott Mine and others, all of which are vein mines.

In the farther western portions of our State no *veins* have yet been profitably worked for gold, but *gravel deposits* have occasionally been opened with success. As such I would particularize the Carson Mine in Eastern Greenville and the Cheohee Mine in Northern Pickens. Still it should be remembered that deposits of this description are necessarily finite. For a while they may yield profit; but the operations must be stopped in time to avoid unnecessary outlay.

The gold veins are of very different kinds. At least three distinct types may be distinguished; but this is not the place to enter upon their description.* Suffice it therefore to say that here, as elsewhere, in none of them can the gold be profitably worked to any very extraordinary depth. One variety of veins entirely gives out in depth; another is restricted to a particular country rock, which is itself of no very remarkable diameter; and the last, though auriferous as far as any exploration as yet extends, contains the gold farther down in a shape inaccessible to the method ordinarily in vogue, while the lead or copper make their appearance.

Copper has not yet been exported by South Carolina. The Cameron Mine in Northeastern Spartanburgh, and the Mary Mine in York District, it is to be hoped will before long commence shipments of this metal. Copper is also found in Edgefield, Abbeville and Lancaster. The Cameron Mine, although at a future day it will probably be most conspicuous for its copper, is at present of more importance with regard to—

Lead. Indeed, it is the only mine in our State, which has hitherto furnished any marketable quantity of that metal. Lead, however occurs also in Pickens and Abbeville. Very small quantities have also been found in Lancaster, but the veins have not been opened and explored.

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* The interested reader will find more on this subject in the writer's official reports, and in an article of his "Der Itacolumit u. seine Begleiter," in Cotta's Gangstudien," vol. III. Freiberg.

Bismuth is found at the Brewer Gold Mine in Chesterfield, but has not yet been worked.

Manganese occurs in Kings Mountain, in the shape of a pyrolusite-bearing bed of the talcose slate. As yet it has not been found in sufficient purity for export. At Mr. Dorn's mine in Abbeville, within a short distance of the gold vein, a superb body of psilomelane, associated with pyrolusite, is observable, sometimes of a width of 50 feet, and even 100, with a perfectly vertical dip. This is probably one of the finest manganese mines in the world, although now lying idle.

Iron abounds on the western slope of Kings Mountain. The most admirable magnetic, and specular ores occur there in inexhaustible quantities. The production cannot, however, compare with the quantity of material, owing to the fact that coal does not occur near it, and that the timber is becoming scarce. The ores are itabirite, specular schist, and catawbarite, which occur as true rocks, belonging to the itacolumitic system. At other points in the State, iron has occasionally been produced from limonite ores; but now all these furnaces have ceased operations, the railroads making foreign iron too cheap to admit of competition, and the maintenance of fences around the fields having consumed the timber.

Limestone appears in York, Spartanburgh, Laurens and Pickens, and, for local consumption, is worked with profit.

Kaolin is found in great variety in Edgefield District, where it is employed for porcelain and chinaware, while the—

Felspar, needed in the manufacture of the same articles, is met with in great abundance in Eastern Pickens, and in Anderson.

On the map I have, in addition to these substances, noted the marl region, traced the boundary of the metamorphic region, and the main zone of eruption of aphanites, diorites and felsitic porphyries, since these latter rocks, and the soils which they yield, are highly important in an agricultural point of view; and, since also they influence the geognostic characters of the up-country very materially. Within the main zone of eruption, the strike of the individual dykes is northeast. On either side their strike is northwest; a feature which is not only highly interesting, but which is accompanied by local influences upon stratified rocks traversed, of no inconsiderable importance. In some places the irregularly shaped eruptive masses have intruded themselves in such a manner as to cause great variations in the otherwise uniformly northeasterly strike of the slates. The crevices produced by the upheavals are, in consequence, in such cases variable in their direction, and thus in the vicinity of these dykes the metaliferous veins do not always present their usual course, which is parallel to the axes produced by elevation and depression.

There is a considerable variety of veins in South Carolina, which may generally be distinguished with ease, owing to marked differences in the structure of the gangue, its varying admixtures, or the peculiar characteristic shape of the crevice. Some of these types are metaliferous, and others, as far as we know, entirely barren. Almost all of them occupy definite positions, or rather distinct areas, or belts, whose general direction is dependant upon our great Southern mountain chain. These belts overlap one another; but may be traced with very great accuracy. There are a few vein types which are confined to certain rocks, and which are therefore dependant upon the presence of the latter, being omitted where erosion has removed their respective countries.* A close examination over a large portion of our State established the perfectly developed succession of rocks to be from below:—gneiss or grey granite; hornblendic schist; micaceous schist; talcose schist; argillaceous schist; itacolumitic series, and limestone. To these may be added the red sandstone, (the same which underlies the North Carolina coal beds), and the cretaceous and tertiary formations. With regard to those enumerated above, it is scarcely necessary to remark that intercalations of other rocks may occasionally occur, without affecting the regular order of distinct varieties. Undoubtedly far too little attention has been paid in the last half century to such very generally observable regular succession of those rocks, which Naumann terms *cryptogene*, but which are more frequently spoken of as *metamorphic*. Formerly, geologists had proceeded too far in one direction; now they but too frequently go as far on the opposite. From what has been said, it is evident that denudation must influence the presence of those veins very powerfully, the position of which is restricted to a certain rock.

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* See Report III., p. 54, where a skeleton section is given, showing the position of the vein-types.

Before we enter upon a brief notice of the areas of cultivated plants, some remarks on those of the indigenous growth will be proper.*

We distinguish five very strongly marked areas of natural vegetation:

I. The extreme mountain growth.
II. The general up country growth.
III. The pine barren region.
IV. The low country swamp growth
V. The littoral growth.

The extreme mountain growth is met with in Pickens and Greenville districts. This belt is characterized by the:

Hemlock, or spruce pine	*Abies canadensis* (Michaux)
Northern, or white pine	*Pinus strobus.*
Mountain laurel	*Rhododendron maximum.*
Cucumber tree	*Magnolia acuminata.*
Long leafed cucumber tree	*Magnolia auriculata.*
Rock chestnut oak	*Quercus prinus monticola.*

These plants follow in an increasing downward range very much as here exhibited. Thus the hemlock does not extend as far downwards as the northern pine. Farther up, in the higher mountains of North Carolina, we find also the table mountain pine (*pinus pungens*), and the black birch (*betula lenta*), neither of which I have found in our State.

The general up-country growth presents among its characteristic trees the:

Spanish oak	*Quercus falcata*	(Michaux).
Black walnut	*Juglans nigra,*	"
Black oak	*Quercus tinctoria,*	"
Chestnut	*Castanea vesca,*	"
Scaly barked hickory	*Carya Alba*	(Elliot).
Slippery elm	*Ulmus fulva,*	(Michaux).
Calico bush or ivy	*Kalmia latifolia,*	"
Red cedar	*Juniperus Virginiana*	"
Short leafed pine	*Pinus tæda,*	"

To these we may add, as more widely diffused here, than lower down the country:

Chincapin	*Castanea pumila,* (M.)
Hickory (common)	*Juglans (Carya) tomentosa.*
Red oak	*Quercus rubra.*

The pine barren zone, which commences but little above the boundary of the tertiary formation, and extends thence to the coast, wherever the soil is sufficiently sandy to favor its growth, is characterized by the long-leafed pine (*pinus palustris* (E.) *p. australis* (M.), and a much greater abundance of black jack oak (*quercus ferruginea*), and scrub oaks (*q. Catesbæi*). The former, often designated as the round-leafed black jack, is characteristic of soil containing some little moisture, while the latter, better known as the forked-leafed black jack, prevails only on the most arid soils of all Sycamores (*platanus occidentalis*), persimmons (*diospyros Virginiana*), red-bud trees (*cercis canadensis*), sweet gums (*liquidambar styraciflua*), sassafras, (*laurus sassafras*), water oaks, (*quercus aquatica*), and suple-jacks (*zizyphus volubilis*), are more abundant here than further up the country, although with some of these is it difficult to give any portion of the State the preference.

The low country swamp growth is not bounded by any lines indicative of climate as far as the area of South Carolina extends. It is peculiar to the swamps and low grounds, which ramify through the region just described. But so extensive are our swamps, and so peculiar is a large part of their vegetation, that the latter requires to be defined separately. We find here the cypress (*cupressus disticha*), the glorious magnolia (*magnolia grandiflora*), the tupulo, (*nyssa grandidentata*), the common cane, (*arundinaria macrosperma* (M. & Y.) *Arundogigantea*). the grey or long moss (*Tillandsia usneoides*), the Spanish bayonet (*Yucca gloriosa*). the winter whortle-berry (*vaccinium arboreum*), the white bay (*magnolia glauca*), among the most striking plants of these regions. The saw-palmetto, (*chamærops serrulata,*) in some cases extends up the river swamps far into the interior. I have seen it on the Savannah as high up as Abbeville district, although it is certainly one of the plants more properly belonging to

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* For the botanical names I am indebted to Dr. John Le Conte.

The littoral growth.—This vegetation is confined to a belt of country running parallel with the coast. The peculiar plants extend to different distances into the interior. Thus the cabbage palmetto, (*chamærrops palmetto,*) rarely occurs more than ten miles from salt water, while the live oak (*quercus virens*) extends as far as forty. These are the two most characteristic trees of this zone. Others, which are more or less distinctive, are the loblolly bay (*gordonia lasianthus*), the American olive, (*Olea Americana*), more abundant in Georgia than with us; Georgia bark, (*pinckneya pubens,*) pond spice, (*laurus geniculata,*) and gall-berry (*prinos glabra*). In addition to these the swamp growth in low grounds, and the pine barren growth in sandy places, extend over the entire littoral belt.

It must be self-evident to the reader, that a State, exhibiting so great and striking a variety in her natural vegetation, and such very decided differences in her soils, should also be enabled to present a great diversity in the agricultural pursuits of her inhabitants. No doubt this variety is increased, or, is, I would say, more strongly emphasized on account of the peculiar geographical position of South Carolina. We live in a latitude where the influences of elevation upon the climate are more decided in their effects upon vegetation, than farther north or south; so that from the mountains to the coast we have the most strongly marked terraces of artificial vegetation. Along our seaboard we find the semi-tropical regions of long-stapled cotton and rice. Then we arrive at the boundary of the great short-stapled cotton zone, which extends up to the line of Pickens, although there along its northwestern limits the summer season is too short to permit its successful cultivation, except on new or highly fertilized lands. Near the boundary of the tertiary we find the lower margin by the belt where corn is grown for the market. Further up we arrive at the lower boundary of the small grain belt. We have, therefore, distinctly defined regions for the production of all the plants grown from the climates of the north to those verging upon the tropics. When the small size of our State is remembered, it will be admitted that few regions are so largely favored by nature. We have not yet fully developed our agricultural advantages by rendering the zones, alluded to, more precise and numerous—making them dependant both upon climate and normal differences of soil. But this will come in time. The profits of grape culture will soon turn more general attention in that direction. The increasing price of stock will before long establish its raising as another source of agricultural prosperity, and so also will it be with other matters, to which it is here unnecessary to attend.

Like other States, we still require that stability of habitation with our people, which is necessary to all permanent improvement in agriculture. It is a great misfortune to the older States that there is a West with cheap and fertile lands. But as we advance in time, as western lands increase in value and our laboring force is gradually increased, while rail roads hurry the produce to market, equalizing its value over the whole country—then too more decided and lasting improvements will be made.

However these reflections will scarcely interest readers beyond our bounds, and this paper has already grown into more bulky dimensions than I had intended.

GEOL. SURV., S. C., Aug. 6, 1859.